ORDER

6750.44

Reprinted To Include
Changes 1 and 2

SYSTEM IMPLEMENTATION PLAN -
INSTRUMENT LANDING SYSTEM

August 1, 1980

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

Distribution: A-X(AF)-3; ZAF-601 Initiated By: APM-410

RECORD OF CHANGES

DIRECTIVE NO.

CHANGE TO BASIC	SUPPLEMENTS			OPTIONAL USE	CHANGE TO BASIC	SUPPLEMENTS			OPTIONAL USE

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FOREWORD

This order transmits appendix 1, system implementation plan (SIP) which sets forth the management direction for implementing the Instrument Landing System (ILS) program in all FAA regions except AEU.

The Chief, Navaids/Communications Engineering Division, is authorized to issue changes to this SIP except that authority to approve changes to existing policy is reserved for the Director, Airway Facilities Service.

GERALD L. THOMPSON
Director, Airway Facilities Service

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DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

6750.44

08/01/80

SUBJ: SYSTEM IMPLEMENTATION PLAN - INSTRUMENT LANDING SYSTEM

1. PURPOSE. This order transmits appendix 1, system implementation plan (SIP) which sets forth the management direction for implementing the instrument landing system (ILS) program in all FAA regions except AEU.

2. DISTRIBUTION. This SIP is distributed to selected offices and services within Washington headquarters, the FAA Technical Center, and the Aeronautical Center, and to branch level within regional Airway Facilities divisions.

3. BACKGROUND. Order 6010.1, Airway Facilities Service Facilities and Equipment Program Manager Assignment, established the requirement for a SIP to describe program coordination and responsibility.

4. ACTION. Program coordination and responsibility for the ILS program shall be in accordance with appendix 1, system implementation plan.

Distribution: A-X(AF)-3; ZAF-601 Initiated By: AAF-420

APPENDIX 1. SYSTEM IMPLEMENTATION PLAN
PART 1
CHAPTER 1. PROGRAM SUMMARY

1. SCOPE AND PURPOSE.

a. This program encompasses the procurement and installation of all equipment necessary for the establishment of a Category I Instrument Landing System (ILS) at selected airports, and the modernization of existing ILS facilities.

b. ILS systems are used for improvement of operational safety by providing electronic signals for positive lateral and vertical guidance to landing aircraft, and can be used regardless of weather conditions. ILS systems are classed by category as to the precision minimums of weather under which their use is permitted. Obstruction clearances and also the runway and approach lighting systems are used in determining category as well as the ILS. Category I ILSs (landing minimums down to 200 feet of ceiling, and one-half mile visibility) significantly enhance safety at most airports. The criteria for a Category I ILS is that the airport is serviced by a scheduled air carrier turbojet on a sustained basis or that the airport eligibility is justified in accordance with the activity criteria in paragraph 9 of Airway Planning Standard Number One (Order 7031.2) and by the benefit/cost analysis methodology contained in Report ASO-75-1, Establishment Criteria for Category I, Instrument Landing System (ILS).

2. BACKGROUND.

(a) Prior procurement of Category I ILS systems include an FY 1968 contract of 11 off-the-shelf van mounted systems installed on a government prepared site on a turnkey installation basis with the government performing all flight checks necessary.

(b) An FY 1969 procurement to an FAA hardware specification of 99 systems without installation.

(c) An FY 1971 procurement to an updated hardware specification of 49 systems without installation.

(d) An FY 1972 procurement of 59 electronic installations on government prepared sites of the prior two procurements due to the government's inability to install equipments when available.

(e) An FY 1973 procurement of 64 systems with an option which was exercised to meet FY 1974 requirements for 37 systems.

(f) a combined FY 1975 and FY 1976 procurement of 122 systems with an option for 34 systems which was exercised to meet part of the FY 1977 requirements.

3. SYSTEM CONCEPT. The ILS is procured to FAA specification. The major items procured are:

a. A full ILS consisting of a localizer, a glide slope, a middle marker and an outer marker.

b. A partial localizer system consisting of a localizer and an outer marker.

c. A partial glide slope system consisting of a glide slope and a middle marker which is used to upgrade a partial localizer to a full system.

d. Remote monitor equipment which can be either a monitor receiver or a landline remote status and control unit.

e. A wide aperture conversion kit used to overcome localizer siting problems.

f. Capture effect and sideband reference conversion kit used to overcome glide slope siting problems.

4. PERTINENT PROGRAM REFERENCES. The original acquisition paper (AP) was approved March 19, 1973, and covered requirements for fiscal years 1973 and 1974. Requirements for succeeding years have been addressed in updates to this original paper.

5.-10. RESERVED.

CHAPTER 2. SYSTEM DESCRIPTION

11. BASIC CHARACTERISTICS. The Instrument Landing System provides the aircraft with three basic types of navigational information, as outlined below. Other aids may be provided to supplement the ILS.

a. Lateral guidance information indicates to the aircraft whether it is to the right, left, or aligned with the approach course line. This information is provided by the ILS localizer.

b. Vertical guidance information indicates the aircraft position above, below, or along the proper descent angle towards the runway touchdown point. The ILS glide slope provides this information.

c. Distance information indicates the aircraft's approximate distance from the runway threshold. This information is provided by the ILS outer and middle markers, and/or distance measuring equipment.

d. Supplementary Aids. Compass locators are sometimes provided at one or both of the marker sites to assist the aircraft in locating the ILS course. Other types of navigational aids may also be used for this purpose. Approach lighting systems with sequenced flashers, and other visual aids, are usually provided to work in conjunction with the ILS.

e. Monitor and Control Equipment. Each ILS is continuously monitored at the site with automatic equipment provided to shut down the facility if the signal parameters exceed preestablished limits. Status indicators, located at the control tower or the nearest FSS, provide ATC personnel with an indication of the system status at all times except, of course, where the status unit is located at a location which is not manned 24 hours per day. At these locations the ILS continues to operate, but the particular airport cannot be designated as an alternate flight terminus when the facility is not manned. At some locations remote control equipment is also provided to permit turning the equipment "on" and "off" from the remote monitor point.

12. EXTERNAL INTERFACES. Procurement of a complete system from a single manufacturer minimizes external interface problems. Those interface requirements which do exist will be documented in the equipment instruction book and/or by an approved drawing. In addition copies of preliminary instruction books will be forwarded to the regional Airway Facilities divisions to aid them in engineering special interface requirements.

13. MAINTENANCE CONCEPT.

a. Site spare boards and modules of each type are provided as part of the system to facilitate immediate restoration.

b. Repair of printed circuit boards shall be performed on-site in accordance with Order 6000.18, Field Repair of Equipment.

14. SOFTWARE PHILOSOPHY. Equipment is not software dependent.

15-20. RESERVED.

CHAPTER 3. PROGRAM FUNDING

21. PROGRAM FUNDING. The ILS program is funded from an annual budget which provides full funding for both equipment and installation for each fiscal year program.

22-30. RESERVED.

CHAPTER 4. PROGRAM REQUIREMENTS AND SCHEDULE

31. PREAWARD. Prior to award of the contract for ILS equipment the following tasks have to be accomplished:

a. Budget approval.

b. Revision of acquisition paper.

c. Approval of acquisition paper by the Transportation System Acquisition Review Council.

d. Specification review/revision.

e. Procurement request.

f. Approval of procurement method if other than Invitation for Bids.

g. Issuance of solicitation.

h. Receipt of response(s).

i. Review.

32. POSTAWARD.

a. Completion of the following tasks is critical to delivery of the ILS equipment:

(1) Completion of electrical/electronic design.

(2) Completion of mechanical design.

(3) Fabrication and assembly of prototype system.

(4) Submission and approval of test procedures.

(5) Completion of contractor's preliminary test, submission and approval of test date.

(6) Submission of reliability/maintainability plan.

(7) Completion of first article tests.

b. Completion of the following tasks is critical to installation of the ILS equipment:

(1) Washington headquarters.

(a) Submission and approval of standard construction drawings and specifications by the contractor.

(b) Submission of original drawings by the contractor after Washington Office approval.

(c) Distribution of drawings to regions.

(d) Issue project assignments.

(e) Delivery of civil construction materials to site.

(f) Delivery of ILS equipment to site.

(g) Review of regional submitted waivers.

(2) Region.

(a) Advise sponsor.

(b) Site survey.

(c) Frequency assignment.

(d) Waivers submitted and approved.

(e) Environmental approval.

(f) Leases signed.

(g) Utilities negotiated.

(h) Construction IFB prepared and advertised.

(i) Construction contract Notice to Proceed.

(j) Construction complete.

(k) Electronic installation start.

(l) Electronic installation complete.

(m) For electronic turnkey sites Joint Installation Inspection, signing of FAA Form-256.

(n) FAA flight inspection.

(o) Joint Acceptance Inspection.

(p) Commissioning.

33. SUPPORT. Completion of the following tasks is critical to providing field support of the ILS equipment:

a. Washington headquarters.

(1) Delivery of instruction books.

(2) Delivery of test equipment.

(3) Delivery of site spare circuit boards and modules.

b. Depot.

(1) Review and approval of provisioning documentation.

(2) Receipt of contract required spare parts peculiar and the determination of additional spare parts peculiar requirement.

(3) Preparation of Initial Supply Support Allowance Charts (ISSACS) and procurement and stockage of common parts.

c. Region. Identify training requirements and schedule personnel for training.

34-40. RESERVED.

CHAPTER 5. PROGRAM MANAGEMENT

41. PROGRAM MANAGER. Program direction of the Category I ILS is assigned to the Navaids/Communications Engineering Division, Terminal Aids Branch, AAF-420.

42. ITEM MANAGERS.

a. The Terminal Aids Branch, AAF-420, is item manager for the localizer, glide slope, marker beacon and ILS remote status equipment. This branch is also item manager for special test equipment peculiar to ILS equipment.

b. The Navaids Branch, AAF-410, is item manager for distance measuring equipment and compass locators which may be required in the Category I ILS program.

c. The Maintenance Engineering Branch, AAF-720, is item manager for common test equipment.

d. The Electro/Mechanical Branch, AAF-530, is item manager for all cable requirements.

43. PROJECT MANAGER. The Category I ILS team, AAF-421, is project manager for this program.

44. MANAGEMENT APPLICATION. Refer to figure 5-1.

a. Management structure. Refer to figure 5-1.

(1) Director, Airway Facilties Service, AAF-1, has overall responsibility for the ILS implementation program and provides active program direction.

(2) ATC Systems and Programs Division, AAT-100, established operational requirements for the ILS system.

(3) Airway Facilities Programs Division, AAF-100, provides F&E funds control, monitoring, and reporting; establishes staffing standards, defines training requirements, and develops standard field organizations.

(4) Navaids/Communications Engineering Division, AAF-400, provides installation system support.

(5) Airway Systems Division, AAF-700, develops requirements for maintenance logistic support, reviews equipment certification requirements, and establishes and maintains the configuration identification baseline.

(6) Contracts Division, ALG-300, is responsible for FAA headquarters procurements, including procurement planning and awarding and administering contracts. The Establishment Branch, ALG-320, provides the Contracting Officer (CO).

(7) Industrial Division, ALG-400, performs contract quality control surveillance and inspection functions. The contract Support Branch, ALG-420, assigns the QRO after equipment contract award.

(8) Aircraft Programs Division, Office of Flight Operations Service, AFO-700, provides staff assistance in the development of the required plans for flight checks when such checks are required.

(9) FAA Depot, AAC-400, will provide logistics and engineering support, including establishing and maintaining a spares inventory and providing for the repair of returned modules.

(10) FAA Academy, AAC-900, will establish and maintain a training course for AF sector and depot maintenance personnel.

(11) Regions. The Airway Facilities division, AXX-400, in each region has project responsibility for each designated site. This includes the engineering and implementation activities of site preparation, system installation, and checkout; joint acceptance inspections; and certification for operational turnover as well as training and staffing.

b. Program procedures.

(1) Planning and scheduling is in accordance with the latest edition of Order AF 6010.1, Airway Facilities Service Facilities and Equipment Program Manager Assignment, which requires the program manager to develop a coordinated program/implementation plan that identifies all activities, schedules, and funding required/available to accomplish the program. The SIP and subsequent revisions will serve as a means for disseminating program information to all affected parties. The Chief, Navaids/Communications Engineering Division, is authorized to issue changes, except that authority to approve changes in policy is reserved for the Director, Airway Facilties Service.

(2) Fiscal status will be provided during program reviews. Order AF 6011.1A, Airway Facilities Service Facilities and Equipment Program Review Procedures, established the program review procedures for Airway Facilities Service F&E programs. Monthly reviews are primarily for status accounting. Quarterly reviews, tied closely to F&E procurement planning, include both physical status accounting and fiscal status.

(3) Logistics support procedures established by the latest edition of Order 4620.3, Initial Support for New or Modified Equipment Installation, will be used for providing the initial allowances of spares, supplies, and working equipment required for the operation and maintenance of new FAA facilities and equipment installations. The FAA Depot will coordinate logistics support requirements in accordance with this order.

(4) Configuration management will use the policy and procedures established by the latest edition of Order 1800.8, National Airspace System Configuration Management, for the end items specified in NAS-MD-001, NAS ATC Subsystem Baseline Configuration. The ILS system hardware baseline is established at the time of initial factory acceptance. Change proposals to this baseline will be coordinated in accordance with Order 1800.8.

45-50. RESERVED.

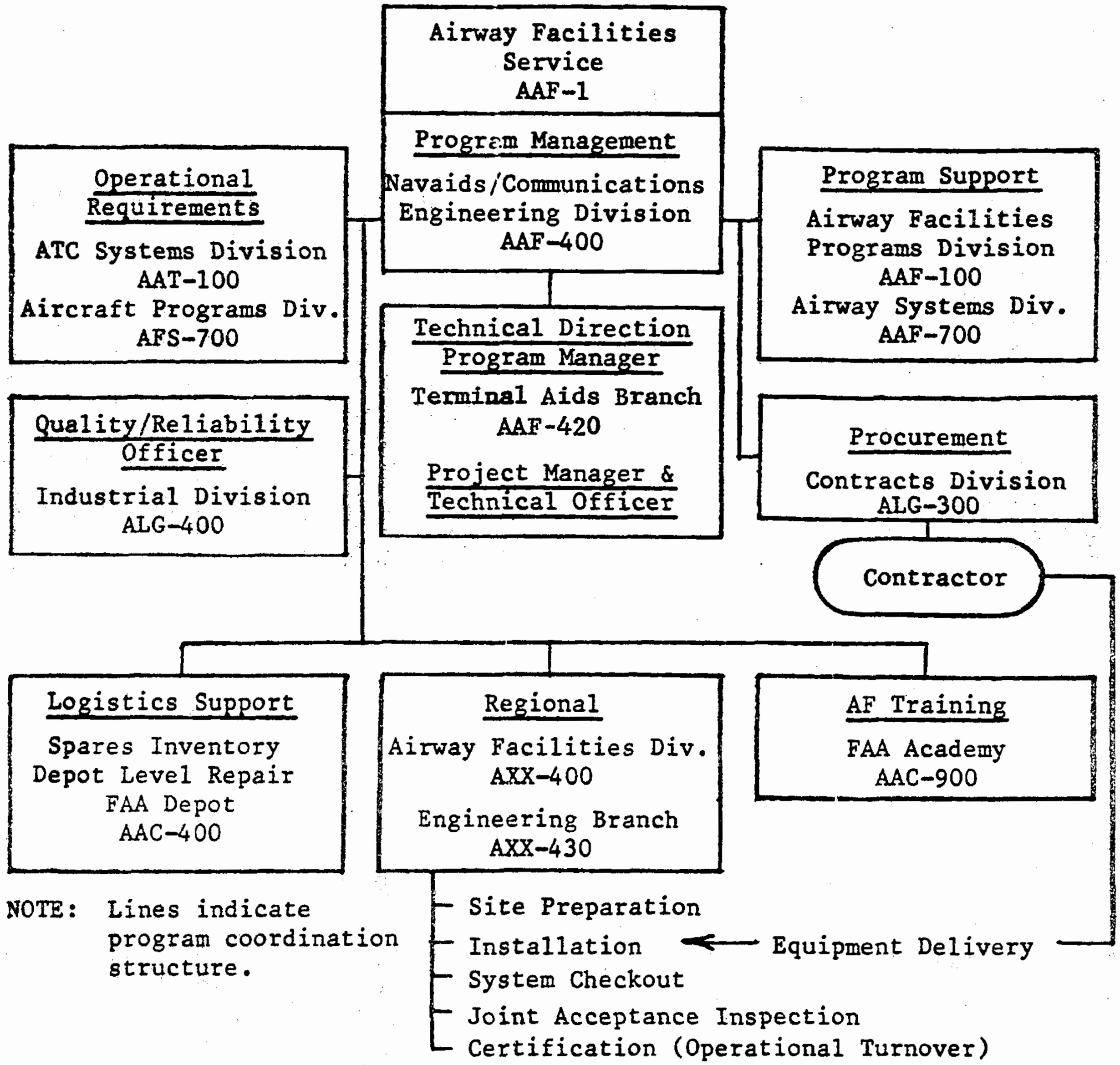


FIGURE 5-1. PROGRAM MANAGEMENT STRUCTURE

PART 2
CHAPTER 1. FIELD DEPLOYMENT

1. CONSTRUCTION MANAGEMENT PLAN.

a. Siting of the ILS will be performed by the region in accordance with the latest edition of Order 6750.16, Siting Criteria for Instrument Landing Systems. If the criteria contained in Order 6750.16 cannot be adhered to a waiver request shall be submitted a minimum of 30 days prior to the start of construction. The waiver request shall be submitted in accordance with the latest edition of Order 6000.20, Waiver of Criteria for Establishment and Maintenance of Airway Facilities.

b. Construction will be accomplished by regional workforce or by regional contract. Standard construction drawings will be coordinated with a least two regions and issued to the regions by the Visual/Landing Aids Branch, AAF-560, through a separate implementing order. Regions are responsible for informing the Terminal Aids Branch, AAF-420, of the progress of the construction and in particular delays which will affect the electronic turnkey installation.

2. INSTALLATION PLAN

a. Test equipment required for installation and normal maintenance consists of a portable ILS receiver supplied as part of the ILS system and the following authorized list of test equipment:

(1) Oscilloscope.
(2) Portable transceiver.
(3) Multimeter.
(4) Transistor tester.
(5) Digital multimeter.
(6) Dummy loads.
(7) Wattmeter and directional elements.

b. Specialized tools are not required.

c. Training will be provided by the Aeronautical Center.

d. Schedules are provided in the attachment to this order.

e. Funding has been provided in accordance with the regionally submitted cost estimates.

f. Assignment of the resident engineers to monitor the turnkey electronics installations will be made by the regions. The names of the resident engineer assigned to an installation shall be provided to AAF-420 at least 30 days prior to the start of the installation.

g. Capitalization will be the responsibility of the regional Logistics division and will be accomplished in accordance with the latest edition of Order 4650.7, Management of Project Material.

3. CONFIGURATION MANAGEMENT PLAN. Configuration management of the ILS and documentation relating to it shall follow the procedures of Order 1800.8, NAS Configuration Management.

4-10. RESERVED.

CHAPTER 2. PROGRAM RESPONSIBILITIES

11. FAA HEADQUARTERS RESPONSIBILITIES. The Navaids/Communication Engineering Division, AAF-400, is the focal point for FAA headquarters activity and is responsible for systems engineering. The Terminal Aids Branch, AAF-420, has been assigned the role of program manager. A project manager has been designated within the AAF-420 staff and will serve as the Technical Officer (TO) for the headquarters equipment procurement. Major FAA headquarters' responsibilities include program management, system engineering, procurement, and establishing requirements for personnel and equipment certification, test equipment, logistics, staffing, implementation, and training.

a. Overall responsibility for the management of the ILS program is provided by the Director, Airway Facilities Service, AAF-1. The Navaids/Communications Engineering Division, AAF-400, has the direct responsibility for managing and directing the engineering and implementation efforts involved in procurement and deployment. AAF-400 has delegated the responsibility for the ILS program to the Terminal Aids Branch, AAF-420, making AAF-420 the program manager, responsible for the technical management of the ILS program including fiscal and physical status reporting.

(1) System requirements, in general, are established as a result of the continuing planning and budgeting process of the FAA. Requests for NAS system expansion and modernization originate from many sources. These program or project requests are subjected to a series of increasingly more detailed planning cycles and reviews until all the funds are budgeted after congressional review and approval. System requirements for the ILS program include operational requirements established by the Air Traffic Service and Flight Operations Service, equipment specifications prepared by Airway Facilities Service, and target schedules and budgets.

(2) Primary program management responsibilities include planning, coordination, and fiscal and physical status accounting and reporting.

b. System engineering for the ILS program is the responsibility of AAF-400. Coordination of all AF tasks in support of the program is included in this system engineering responsibility. This includes establishing and maintaining equipment specifications, technical support to the contracting officer, establishing requirements for site adaptation, test equipment, logistics, and maintenance analysis.

(1) Providing technical information to other organizations is an AAF-400 responsibility. As the equipment procurement progresses, the equipment contractors will be a major source of this information which will include instructions for equipment installation, system checkout, calibration, and operation. This and other technical data will be made available to support the regional engineering activities. AAF-400 will be responsible for the adequacy and accuracy of the technical information supplied to the regions.

(2) ILS equipment contractor technical monitoring is the responsibility of AAF-420 during the design and development phase of the contracts. Scheduled

design reviews at the contractors' facilities and detailed reviews of technical data submitted for FAA concurrence provide the basis for contract performance appraisals. AAF-420 provides technical support to the QRO during factory acceptance and demonstration test performance and evaluation. AAF-420, acting as the TO, is specifically responsible to the contracting office for contractor technical performance evaluation and reporting when equipment performance or contract schedule requirements may be impacted.

(3) Site technical support is provided by AAF-420 as required and available. During installation, checkout, and certification, AAF-420 maintains technical cognizance of overall engineering activities.

(4) Maintenance analysis will be performed by AAF-720 (Maintenance Engineering Branch) which is responsible for determining equipment maintenace requirements including support equipment, logistics levels, and certification of both equipment and personnel. AAF-720 will coordinate these requirements with AAF-420 and other organizations.

(5) Affected organizations are:

(a) AAF-420 - Terminal Aids Branch
(b) AAF-720 - Maintenance Engineering Branch

c. Procuring office for all national buys is the Logistics Service, ALG. The Contracts Division, Establishment Branch, ALG-320, has contract responsibility with ALG-322 designated as the CO. To assist the CO in technical evaluation of responses to the equipment contract requests for proposal, technical proposal evaluation teams are designated. The teams are staffed with representatives from various organizations to provide the broad range of experience necessary for technical proposal evaluation. Subsequent to contract awards, the TO and QRO are assigned to assist the CO in technical contract administration. Affected organizations are:

(1) ALG-320 - Establishment Branch
(2) ALG-410 - Industrial Evaluation Branch
(3) AAF-420 - Terminal Aids Branch
(4) AGC-54 - General Contracts Branch

d. Insuring that logistic support material requirements are established is the responsibility of the Logistics Service, Material Management Division, Material Systems Branch, ALG-220. Affected organizations are:

(1) ALG-220 - Material Systems Branch
(2) AAF-720 - Maintenance Engineering Branch
(3) AAF-420 - Terminal Aids Branch

e. Establishing staffing standards is the responsibility of the Management Engineering Branch, AAF-160. In addition to establishing staffing standards, training requirements for AF personnel are defined. The Technical Training Branch, APT-310, is responsible for developing the training plan and coordinating with the FAA Academy, AAC-900. Affected organizations are:

(1) AAF-160 - Management Engineering Branch
(2) AAF-720 - Maintenance Engineering Branch
(3) AAF-420 - Terminal Aids Branch
(4) APT-310 - Technical Training Branch

12. AERONAUTICAL CENTER. The Aeronautical Center, AAC, in Oklahoma City, provides two important national support activities: the FAA Depot, AAC-400, for maintenance material support and the FAA Academy, AAC-900, for maintenance training.

a. Logistics data and coordination of logistics support activity at the depot will be accomplished through AAC-422 (Electronic Production Section) which is the technical interface.

b. Training support technical interface is AAC-940 (Airway Facilities Branch) for coordination of ILS system maintenance training support at the Academy.

c. Affected organizations are:

(1) AAC-440 - Engineering and Production Branch.
(2) AAC-442 - Electronic Production Section.
(3) AAC-940 - Airway Facilities Branch.

13. FAA REGIONS. All FAA regions, containing any of the ILS sites listed in attachment I, are responsible for the ILS systems during the installation program. Maintenance is the responsibility of sector AF personnel.

a. Project implementation is the responsibility of the Airway Facilities Division of each region for the affected sites. Implementation activities include site preparation, installation and checkout, and certification. Specific activities will include the following:

(1) Site engineering is the responsibility of the regions for normal engineering activities required for site support.

(2) Site preparation prior to equipment delivery, acceptance inspection, and performance certification is a regional responsibility in accordance with FAA headquarters provided guidance and instructions.

(3) Joint Acceptance Inspections (JAI) will be conducted, in accordance with the latest edition of Order 6020.2A, Joint Acceptance Inspections for FAA Facilities, by a joint acceptance board established by each region. The board will be responsible for inspection of, and concurrence with, all physical equipment and documentation. The purpose of the JAI is to insure that the facility and equipment are acceptable for commissioning.

b. Affected Organizations. The primary responsibiliy for the ILS system is the Airway Facilities Division, AXX-400, of the affected regions. The Engineering Branch is responsible for regional implementation plans and defining organization responsibilities within each region in accordance with FAA Headquarters provided guidance and instructions.

14. CONTRACTOR. The contractor's designing, development, quality and manufacturing of ILS equipment is in accordance with the technical requirements of FAA-E-2492/1, FAA-E-2492/2 and FAA-E-2492/4 and the contractural requirements of the solicitation. In addition to supplying the equipment specified, the contractors are responsible for the following:

a. Instruction manuals in accordance with FAA-D-2494/1 and FAA-D-2494/2 are required.

b. Provisioning documentation in accordance with FAA-G-1210 is required.

c. Reliability and maintainability programs as described in paragraphs 1-3.19 and 1-3.20, respectively, of FAA-G-2100/1, Part 1, Basis Requirements for All Equipment, are required in accordance with FAA-E-2492/2.

d. Test plans and procedures are provided for FAA approval.

15-20. RESERVED.

CHAPTER 3. COMMUNICATIONS

21. GENERAL COMMUNICATIONS. The ILS program manager, AAF-420, is the focal point for all internal communications. In order to successfully proceed with the system deployment, AAF-420 must be aware of all significant program activities. In addition to his direct interface with the project manager/TO, the program manager must insure that the necessary program information is available to the organizations that have action responsibility. Program requirements and schedules will be coordinated with the regional Airway Facilities divisions.

22. CONTRACTOR COMMUNICATIONS. In accordance with FAA policy, interface with and communications to contractors are authorized for specific purposes. The contracting officer (CO) has the direct contract responsibility and is responsible for all contractual matters. The CO is the only one authorized to approve changes that will impact price, delivery, or schedule.

a. The Contracting Officer (CO) has been designated in ALG-322. As such, ALG-322 is the office responsible for all contractual matters.

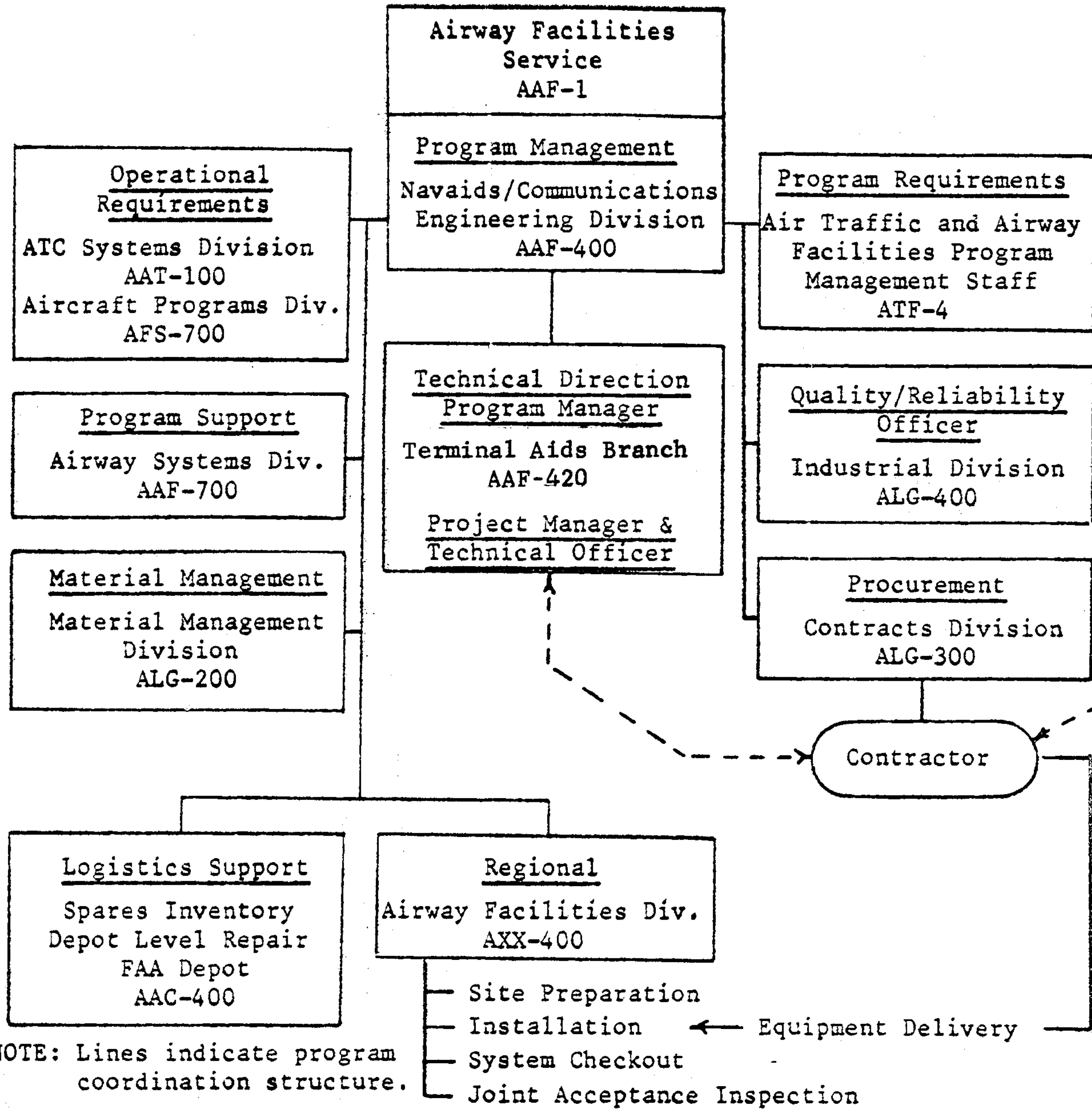
b. The Program Manager has been designated as the Chief, AAF-420. A project manager has been designated from the AAF-420 staff. He is also the Technical Officer (TO). Thus, AAF-420 is authorized to perform technical interface with the contractor's representatives.

c. The Quality/Reliability Officer (QRO) has been designated from ALG-400. The QRO is the FAA's representative at the contractor's facilities and is primarily concerned with quality and reliability issues. The QRO is directed by FAA policy and procedure and by the terms and conditions of the contract.

d. The equipment contractor has designated specific individuals in the contractor organization to act in corollary positions to those listed above.

23. INTERNAL COMMUNICATIONS. Figure 3-1 depicts the major communications channels for the ILS program. Like the program management structure of Part 1, Chapter 5, the communication channels focus on AAF-400. Contractual communications are authorized for the CO, TO, and QRO as shown by the dashed lines. Participating organizations are responsible for designating organization elements and individuals who will perform and/or coordinate program activities. Nothing in this chapter is intended to inhibit normal FAA internal communications. Instead, the intent is to emphasize the offices which are primarily concerned with the ILS program. ALG-322 (CO), AAF-420, (TO), and ALG-420 (QRO) all have responsibility for contract matters and thus are the internal offices to contact for contract communiations.

24-30. RESERVED.



NOTE: Lines indicate program coordination structure.

FIGURE 3-1. COMMUNICATION CHANNELS

CHAPTER 4. ACCEPTANCE INSPECTIONS

31. EQUIPMENT QUALITY CONTROL PROVISIONS. Tests performed at the contractor's facility include contractor's preliminary tests, design qualification tests, type tests, production tests, and Federal Communications Commission type acceptance tests. These tests verify that all specification requirements are met. Reliability and maintainability demonstrations will be performed at sites selected for this purpose.

32. PRELIMINARY FLIGHT INSPECTION. Flight inspection conducted by the contractor during turnkey installations assures an acceptable facility is installed prior to FAA commissioning flight inspection and serves to minimize the time required for commissioning flight inspection. Preliminary flight inspections which do not meet Category I requirements, are not sufficient basis for rejecting the turnkey installation since the failure may be due to terrain conditions beyond the contractor's control. The contractor is responsible for corrective action only if the condition is attributed to improper installation or adjustment by the contractor, or improper flight inspection procedures.

33. JOINT INSTALLATION INSPECTION. A joint installation inspection is held between the contractor's installation team and the FAA's resident engineer for all turnkey projects to determine if all specification and contract requirements have been met. Acceptance of the system is documented by the FAA resident engineer's signature on FAA Form 256.

34. FAA FLIGHT INSPECTION. FAA flight inspection is performed on all systems prior to commissioning in accordance with the requirements of OA P 8200.1, United States Standard Flight Inspection Manual.

35. JOINT ACCEPTANCE INSPECTION. A joint acceptance inspection shall be conducted in accordance with the latest edition of Order 6020.2A, Joint Acceptance Inspection for FAA Facilities prior to commissioning.

36-40. RESERVED

ATTACHMENT 1. MARK IF ILS PROGRAM

1. ~~PROGRAM SUMMARY.~~ The Mark IF program will cover all unfulfilled FY 1977 requirements, all FY 1978 requirements, all FY 1979 requirements and all FY 1980 requirements. It includes the following:

   99 full systems including 30 with electronic turnkey installations

   62 partial localizer systems including 30 with electronic turnkey installation

   44 partial glide slope system includng 8 with electronic turnkey installation

   33 capture effect conversion kits

   23 sideband reference conversion kits

   3 wide aperture conversion kits

2. SCHEDULE SUMMARY.

   AP update for FY 1977, 1978, and 1979 approved 9/29/78 #

   RFTP issued 9/27/78 #

   Technical proposals received 2/15/79 #

   AP update for FY 1980 approved 4/2/79 #

   IFB issued 5/3/79 #

   Contract awarded 9/24/79

   Delivery of first three systems 7/80 thru 1/81

   Delivery of follow on systems 5/81 through 3/84

Actual Date

3. SITE ACTIVATION PLAN. The following subsection paragraphs detail installation activities and clarify Wilcox's responsibilities with regard to certain aspects of the installation.

a. TYPICAL LOCALIZER SITE ACTIVATION PLAN

1.0 Civil Installation

One hundred eighty days prior to the scheduled installation start date, Wilcox will deliver to the site the localizer shelter and associated installation kits. The Government will install the shelter on the government-supplied foundation and provide power to the service entrance panel. The Government will also provide and install the required cables between the localizer shelter and antenna. The Government will terminate the cables in the shelter junction box and stub the antenna end for later termination by Wilcox.

1.1 Ready Equipment for Tune-up

The Wilcox TR will unpack and inspect the electronics equipment. He will install the equipment rack in the shelter. The rf, signal and power cables will be installed and connected between the equipment rack and the shelter junction box.

1.2 Electrical Test of Shelter

After commercial power is installed and activated, the shelter is ready for a complete electrical system test. With the FAA TR observing, the air conditioner, heater, ventilation fan, and louver are all checked for proper operation.

Power is turned on and checked to the equipment rack.

Interior and exterior shelter lights are checked for proper operations.

After completing the shelter activation, the Wilcox TR will erect the antenna system.

1.3 Erect Localizer Antenna

Wilcox materials necessary to install the localizer antenna array on government-installed foundations will have been delivered to the site, unpacked, inspected for physical damage, and organized for installation. Antenna supports will be mounted and leveled to accept the antenna elements. Raceways, antenna feed cables, grounding systems, and antenna misalignment hardware, and the rf distribution box will be mounted on the antenna supports and adjusted to achieve proper alignment and spacing; such installation and adjustment will be in accordance with the installation instructions in the relevant equipment/station instruction book. Having physically installed all antenna hardware, interconnection of the array elements and the transmitter equipment will allow checkout of the station components as a system.

1.4 Terminate Cables

Wilcox will terminate all array interconnect cabling at the distribution and rf-combining networks, and the antenna elements. Government-supplied underground rf, signal, and power cables will be terminated at the appropriate points, at the rf distribution box.

1.5 Check VSWR

Antenna system and feed cables will be tested for the presence of voltage standing waves utilizing the rf power panel which is an integral part of the station equipment. Both carrier-plus-sideband and sideband-only antenna feed systems will be tested to verity that VSWR's are within those tolerances specified in the equipment/station instruction books.

1.6 Ground Check System

Using the portable field receiver, Wilcox will perform ground inspection of the localizer to determine the location of signal nulls. Ground checking will be accomplished with the FAA TR observing, and measurements of null placement will be referenced to FAA established ground check points.

Antenna pair-nulls will be established to facilitate adjustment of feed cable lengths. Having determined pair-null locations, antenna feed cable lengths will be adjusted to position the composite null, relative to runway centerline, within the tolerances specified in the applicable equipment/station instruction book. Upon completion of alignment adjustments, course width will be set by establishing the proper ratio of CSB and SBO signal levels. Proper phasing of the integral monitoring system will be achieved to establish monitor tracking with respect to the signal in space.

1.7 Preliminary Monitor Adjustment

Integral monitoring system adjustment will include adjustment of monitor return cable lengths, course/position, course/width, antenna fault, antenna misalignment, percent of modulation, etc., and applicable alarm limits as detailed in the equipment/station instruction book. Preliminary monitor adjustment and alarm settings will demonstrate functional operation of the station equipment. Equipment settings made during this phase of site activation are for test purposes and may not reflect the final settings. Final equipment settings and alarms adjustment will be made during preliminary flight inspection, and will be such that the settings and alarms reflect the localizer approach pattern tolerances.

1.8 Contractor Flight Inspection

The localizer will be flight inspected as specified in OA P 8200.1 except that the backcourse will not be checked.

1.9 Joint Installation Inspection

Prior to completion of the 96-hour stability demonstration, the joint installation inspection will be held. Such inspection may be informal in nature. Any action necessary to correct such discrepancies will be accomplished during the 96-hour stability demonstration if practicable. Upon completion of the 96-hour stability demonstration, a formal joint installation inspection will be conducted. At this time, the FAA TR can verify that all problem areas have been resolved, and that all discrepancies have been corrected in compliance with contract requirements. Data documenting facility performance will be submitted for verification and as-built drawings will be checked to determine that they are true and correct as marked up to reflect changes resulting from activities by Wilcox.

1.10 198 Data

The Wilcox Technical Representative, with the FAA TR observing, will gather and record facility data for the installation. Data so gathered will be recorded on government-supplied 198 forms, such data document the operation of the facility and compliance with specifications as they relate to equipment performance.

1.11 96-Hour Stability Run

All systems which successfully pass flight inspection will be subjected to a 96-hour test to demonstrate system stability. Systems at a particular site location will be run concurrent to provide maximum time/personnel utilization. Wilcox personnel will monitor station operation and be available to perform restoration maintenance should failures occur.

1.12 Site Cleanup

Excess construction materials and debris resulting from Wilcox installation activities and Wilcox equipment will be removed and/or disposed of properly. The equipment and site areas will be left in a neat and workman like appearance.

1.13 Final Acceptance

With all facilities operating within tolerances, all discrepancies corrected, and all sites and shelters cleaned, Wilcox will present the final product, a complete ILS for acceptance by the Government through its duly appointed representative, the FAA TR. At the time of final acceptance, the FAA TR will have all data, documentation, and site-related drawings necessary to present the facility to the maintenance sector as a complete facility. The culmination of installation activities will be the signing and delivery of FAA Form 256 to the Wilcox Technical Representative and delivery of the "turnkey" by Wilcox to the FAA TR.

This completes the site activation plan for the localizer.

b. TYPICAL GLIDE SLOPE SITE ACTIVATION PLAN

The following presents the site activation for the glide slope.

2.0 Civil Installation

One hundred eighty days prior to the scheduled installation start date, Wilcox will deliver to the site the glide slope shelter, shelter installation kits, transmitting antenna tower and path monitor tower. The Government will install the shelter on the government-supplied foundation and provide power to the service entrance panel.

The Government will erect the transmitting antenna tower and install the required conduits from the glide slope shelter to the tower. The Government will also erect the path monitor tower and conduits. The Government will provide and install the required cables from the glide slope shelter to the path monitor tower.

2.1 Ready Equipment for Tune-Up

Same as Localizer, see paragraph 1.1.

2.2 Electrical Test of Shelter

Same as Localizer, see paragraph 1.2.

2.3 Install Antennas on Tower

The transmitting antennas will be installed on the tower at the height calculated for the offset for the given airport. Final height and offset wll be determined by the FAA commissioning flight inspection.

The path monitor detector/antenna will be installed on the path monitor tower at the approximate location of the glide slope, 0 ddm point. Positioning of the detector/antenna on the tower will be established after the Wilcox preliminary flight inspection.

2.4 Install and Terminate Cables

Wilcox will furnish and install the cables between the transmitter tower and the shelter. Wilcox will only be responsible for furnishing and installing these cables for a normal installation (5-foot offset).

The cables will be terminated at the antennas and at the equipment cabinet.

The near-field path detector will be connected to the FAA-furnished and installed cable at the path monitor tower.

This cable shall be long enough that no splicing will be required by Wilcox. The opposite end of the cable will be terminated at the shelter junction box.

2.5 Check Antenna VSWR

The VSWR of the antennas will be checked using the wattmeter located in the rf power panel in the glide slope station. After measuring forward and reverse power, VSWR will be calculated.

2.6 Tuneup and Ground Check

The antennas will be energized and the transmitter will be adjusted to calculated values of rf power. The modulation balance will be adjusted to 0 ddm with the portable ILS receiver. The portable ILS receiver will be used to phase the facility. This phasing point is usually betwen 2500 feet and 4000 feet from the facility. The exact point will be dictated by terrain and accessibility. The ground phasing point will be established after Wilcox flight inspection, to correlate with airborne phasing.

The glide slope angle and course width will be checked at the near-field path monitor tower.

With the preliminary transmitter adjustments complete, the system is ready for preliminary monitor adjustment.

2.7 Preliminary Monitor Adjustment

The near-field path monitor antenna will be positioned on the tower at the 0 ddm point. The integral monitor combining network will be phased and adjusted for proper width and path indications. The rf level will be adjusted for a normal indication.

Preliminary monitor adjustment is only to ensure that the monitor is functional. Final monitor adjustment will be accomplished during flight inspection.

2.8 Contractor Flight Inspection

The glide slope station will be flight inspected as specified in OA P 8200.1. The preliminary inspection will confirm that a flyable glide slope does not exist at twice the glide angle.

The radio telemetering theodolite will be used as specified in paragraph 217.32 of OA P 8200.1.

2.9 Joint Installation Inspection

This section is the same as the localizer. See paragraph 1.9.

2.10 198 Data

This section is the same as the localizer. See paragraph 1.10.

2.11 96-Hour Stability Run

This section is the same as the localizer. See paragraph 1.11.

2.12 Site Cleanup

This section is the same as the localizer. See paragraph 1.12.

2.13 Final Acceptance

This section is the same as the localizer. See paragraph 1.13.

This completes the installation plan for the glide slope.

c. TYPICAL MARKER BEACON SITE ACTIVATION PLAN

Those marker beacon site activation activities that are common to localizer and glide slope site activations and covered in prior paragraphs are not repeated below:

3.0 Civil Installation

One hundred eighty days prior to the installation start date, Wilcox will deliver to the site the marker beacon shelter, antenna tower and associated installation kits. The Government will install the shelter and tower on the government-supplied foundations and provide power to the service entrance panel.

3.1 Ready Equipment for Tune-Up

The Wilcox TR will unpack and inspect the electronics equipment. He will install the equipment and the equipment rack in the shelter.

3.2 Install Antenna and Cables

Wilcox will supply and install the marker beacon antenna on the government-installed tower.

Wilcox will supply and install the antenna-to-shelter transmitter and monitor cables. The cables will be properly secured to the tower to present a neat appearance. After the cables are connected to the antenna and to the transmitter, the marker beacon will be ready for tune-up.

3.3 Check VSWR and Tune-Up

Forward and reverse power will be checked, using the thruline wattmeter body in the equipment cabinet. From these readings, VSWR will be calculated. A thruline wattmeter wil be used to verify that the VSWR is within tolerance.

Tuneup of the marker beacon consists of the adjustment of the modulation percentage and power output. The transmitter will be checked for proper identification coding.

3.4 Contractor Flight Inspection

The marker beacon will be flight inspected as specified in OA P 8200.1, paragraph 219.5 and figure 219F contained therein, on path, with new calibration.

Measurement runs for the marker beacon will be made in conjunction with the glide slope recording runs, if possible.

This completes the installation plan for the marker beacon.

d. REMOTE MONITOR AND REMOTE STATUS/CONTROL INSTALLATION

The following section describes the installation of the remote monitor and control systems.

4.0 Inspect and Verify Mounting Location

The FAA TR will identify where the remote control/status/monitor equipment will be installed and verify that sufficient rack and panel space is available for mounting the equipment. The FAA TR must verify that ac power is available within 6 feet of the unit and that control lines, where used, are properly identified. Identification must include cable pairs and location, such as localizer shelter, pair No. 1, etc. The government-provided control cables must be terminated within 100 feet of the ILS control unit and cable trays or conduits must be provided.

4.1A Install and Tune-Up Localizer Receiver

When a localizer receiver is required it will be installed in an existing rack in the location specified by the FAA. The receiver antenna will be installed at the location specified by the FAA. Wilcox will provide and install the cabling between the receiver and antenna.

4.1B Install and Tune-Up Glide Slope Receiver

Installation same as localizer. See paragraph 4.1A.

4.1C Install Status/Control Unit

When a status/control unit is required it will be installed in an existing rack in the location specified by the FAA. Cabling from the unit to the FAA termination point, up to 100 feet, will be provided and installed by Wilcox.

4.2 Install Remote Status Unit

When a remote status unit is required, it will be installed in an existing rack in the location specified by the FAA. Cabling from the unit to the status/control unit or monitor receivers, up to 200 feet, will be provided and installed by Wilcox.

4.3 Check Monitoring and Control Operations

Wilcox will tune and adjust the units in accordance with the applicable instruction manuals. With the units operating properly the following checks will be made:

(1) When receiver monitoring is used the localizer and/or glide slope will be turned off and the outage will be verified by the status indicator unit.

(2) When landlines are used for remote monitoring the remote control unit will be used to turn off the localizer and/or glide slope station. The outage will be verified by the remote status.

e. INSTALLATION OF MODIFICATION KITS

As was the case for the Mark IE ILS procurement , this procurement specifies the supply and installation of conversion equipment kits for:

(1) Capture-effect glide slope.

(2) Sideband reference glide slope.

(3) Wide aperture localizer antenna arrays.

In general, the installation and flight inspection procedures that Wilcox intends to follow in completing one of the above conversions in a continuation of the site activation plan Wilcox proposes for typical localizer and typical glide slope installations.

Capture-effect glide slope conversion: Wilcox will provide all labor and material necessary to complete the conversion.

Initial capture-effect installation: The installation will be completed in the same manner as a null reference except Wilcox will provide all the material and labor to install the near-field monitor.

Sideband reference glide slope conversion: Wilcox will provide all labor and material necessary to complete the conversion.

Initial sideband reference installation: The installation will be completed in the same manner as a null reference. The Government will provide for the civil construction of the near-field monitor elevated counterpoise.

Wide Aperture Conversion: Wilcox will provide all labor and material to complete the conversion except the Government will be responsible for the extension of the antenna foundation or elevated platform.

Initial wide aperture installation: The installation will be completed in the same manner as a normal localizer.

Full Systems

Revision 3

	LOCATION	PCN	REMOTE MONITOR	CONV. KITS	INST. TYPE	CIVIL CONST.	ELECT. INST.	FREQ.	DELIV. DATE	FY	REG	REMARKS
1.	Traverse City, MI 36	TPPC	RCVR	C	T	7/80	1/81	110.5	3/81	78	GL	Test Site
2.	Lorrain, OH 07	UPVC	RCVR		T	7/80	1/81	111.7	3/81	78	GL	Test Site
3.	Lubbock, TX 26	2QJC	RCVR		T	7/80	1/81	111.9	3/81	79A	SW	Test Site
4.	Manchester, NH 35	GJVC	RCS/I	C	R			109.1	7/81	80R	NE	
5.	Moses Lake, WA 32R	PEYC	RCS		R			109.5	7/81	80R	NW	
6.	LaGuardia, NY 31	TPDC	RCS/I		R				8/81	78	EA	
7.	Kansas City, MO 27	TNZC	RCS/I		R				8/81	78	CE	
8.	FAA Academy	-	RCS		R				9/81	--	AC	
9.	Klamath Falls, OR 32	PEWC	RCS		R			109.5	9/81	80R	NW	
10.	Topeka (F.F.), KS 31		RCS		R			110.1	10/81	80R	CE	
11.	Lincoln, NE 17R	TPAC	RCS/I		R				10/81	78	CE	
12.	Obyan, Saipan	IREC	RCVR		R				11/81	79S	PC	DME
13.	Akron Canton, OH 19	TPJC	RCS/I	C	R			109.5	11/81	78	GL	
14.	Flint, MI 27	TPLC	RCS/I		T	3/81	9/81		11/81	78	GL	
15.	Peoria, IL 12	TPNC	RCS/I	C	T	3/81	9/81	109.9	11/81	78	GL	
16.	Middletown, PA 31	RPEC	RCS/I		T	3/81	9/81		11/81	78	EA	
17.	Huntington, WV 30	TPCC	RCS/I	S	T	3/81	9/81		11/81	78	EA	
18.	Monroe, LA 22	UQAC	RCS/I	C	T	3/81	9/81	109.5	11/81	78	SW	
19.	Mankato, MN 31	TPMC	RCVR		R			108.7	12/81	78	GL	

Full Systems

	LOCATION	PCN	REMOTE MONITOR	CONV. KITS	INST. TYPE	CIVIL CONST.	ELECT. INST.	FREQ.	DELIV. DATE	FY	REG	REMARKS
20.	Miami, FL 30	UPZC	RCS		R				12/81	78	SO	
21.	Evansville, IN 04	TPKC	RCS/I	C	R			109.9	1/82	78	GL	
22.	Ft. Lauderdale, FL 09R	2PZC	RCS		R				1/82	79C	SO	
23.	Atlantic City NJ 01 (Bader)	TPBC	RCVR		R				2/82	78	EA	
24.	Tulsa, OK 36L	IRMC	RCVR	C	R			109.9	2/82	79S	SW	
25.	Miami, FL 12	TPQC	RCS		R				3/82	78	SO	
26.	Bemidji, MN 31	2PHC	RCVR		R			111.9	3/82	79C	GL	
27.	San Francisco, CA 10R	IRNC	RCS/I	C	R				4/82	79S	WE	
28.	Savannah, GA 36	2QHC	RCS		R				4/82	79C	SO	
29.	Ely, NV 18	2QLC	RCVR		T	8/81	2/82		4/82	79A	WE	
30.	Tampa, FL 18R	TPRC	RCS	C	T	8/81	2/82		4/82	78	SO	
31.	Saginaw, MI 23	IRBC	RCS/I		T	8/81	2/82	108.7	4/82	79C	GL	
32.	Greenwood, MS 18	2QBC	RCVR		T	8/81	2/82		4/82		SO	
33.	Pittsburgh, PA 10R	TPFC	RCS/I		T	8/81	2/82		4/82	78	EA	
34.	San Diego, CA 27	UQCC	RCS/I		R				5/82	78	WE	DME
35.	Thief River Falls, MN 31	2PQC	RCVR		R			110.5	5/82	79C	GL	
36.	Joplin, MO 35 1/	2PCC	RCVR		R				6/82	79C	CE	
37.	Durango, CO 02	IRGC	RCVR		R				6/82	79S	RM	
38.	Astoria, OR 25	2PSC	RCVR		R				7/82	79A	NW	NDB

Note 1/- Reprogramming deferred by ABU.

Full Systems

	LOCATION	PCN	REMOTE MONITOR	CONV. KITS	INST. TYPE	CIVIL CONST.	ELECT. INST.	FREQ.	DELIV. DATE	FY	REG	REMARKS
39.	Bangor, ME 33	BVNE	RCS/I	C	R			110.3	7/82	79A	NE	
40.	Ft. Lauderdale, FL 27R	2QAC	RCS	S	R				8/82	79A	SO	DME
41.	Caldwell, NJ 22	2PDC	RCVR	S	R				8/82	79C	EA	
42.	Morristown, NJ 05	2PFC	RCS/I	C	R				9/82	79C	EA	
43.	Indianapolis, IN 13	1QZC	RCS/I		R			110.5	9/82	79S	GL	
44.	Meridian, MS 19	2QFC	RCS	C	T	1/82	7/82		9/82	79C	SO	
45.	Tupelo, MS 18	2QDC	RCVR		T	1/82	7/82		9/82	79C	SO	NDB
46.	Elmira, NY 06	2PEC	RCS/I		T	1/82	7/82		9/82	79C	EA	
47.	Syracuse, NY 32	2PGC	RCS/I		T	1/82	7/82		9/82	79C	EA	
48.	Yankton, SD 31	2PYC	RCVR	C	T	1/82	7/82		9/82	79C	RM	NDB
49.	Port Huron, MI 04	1RAC	RCVR		R			110.5	10/82	79S	GL	NDB
50.	Manistee, MI 27	2PNC	RCVR		R			109.7	10/82	79S	GL	
51.	Nantucket, MA 33	1RCC	RCS/I		R				11/82	79S	NE	DME
52.	Lihue, HI 35	QX7E	RCVR		R				11/82		PC	DME
53.	Riverton, WY 28	2RJC	RCVR		R				12/82	79S	RM	
54.	Cedar City, UT 20	2PVC	RCVR		R				12/82	79C	RM	
55.	Billings, MT 27	1RFC	RCS	S	R				1/83	79S	RM	
56.	Savannah, GA 27	1RKC	RCS		R				1/83	79S	SO	
57.	Ft. Smith, AR 07	1RZC	RCS/I		R			109.5	2/83	79S	SW	

Full Systems

LOCATION	PCN	REMOTE MONITOR	CONV. KITS	INST. TYPE	CIVIL CONST.	ELECT. INST.	FREQ.	DELIV. DATE	FY	REG	REMARKS
58. Cleveland, OH 18R		RCS/I	C	R				2/83	79C	GL	DME
59. Butler, PA 07	4BAC	RCVR		T	6/82	12/82		2/83	79A	SW	
60. Seattle, WA 34L	2PTC	RCS/I	S	T	6/82	12/82	111.7	2/83	79C	NW	
61. Green Bay, WI 24L	2PMC	RCS/I		T	6/82	12/82	109.5	2/83	79C	GL	
62. Detroit (W.R.), MI 23L	2PLC	RCS/I		T	6/82	12/82	109.5	2/83	79A	GL	
63. Fargo, ND 17	2PWC	RCS/I		T	6/82	12/82		2/83	79A	RM	
64. Memphis, TN 27	2QEC	RCS		R				3/83	79C	SO	
65. Cleveland, OH 36L	2PKC	RCS/I	C	R				3/83	79C	GL	
66. Tyler, TX 22	4CBC	RCVR	C	R			109.9	4/83	80	SW	
67. Oklahoma City, OK 35L	4CAC	RCS	C	R			110.7	4/83	80	SW	
68. Jamestown, NY 25	AZQE	RCVR		R			109.7	5/83	80R	EA	
69. Hyannis, MA 15	UPWC	RCVR		R			111.1	5/83	78	NE	DME?
70. Washington, DC 18	AZRG	RCS	S	R			108.5	6/83	80R	EA	
71. Bedford, MA 11	PDSC	RCS/I	C	R			109.5	6/83	80R	NE	
72. Eugene, OR 16	PEVC	RCS		R			109.5	7/83	80R	NW	
73. El Paso, TX 26	4BZC	RCVR		R			111.9	7/83	80	SW	
74. Flagstaff, AZ 21	2QKC	RCVR	C	T	12/82	5/83		7/83	79C	WE	NDB
75. Sarasota, FL 13	2QCC	RCVR		T	12/82	5/83		7/83	79A	SO	
76. London, KY 05	2QGC	RCVR	C	T	12/82	5/83		7/83	79C	SO	

Full Systems

LOCATION	PCN	REMOTE MONITOR	CONV. KITS	INST. TYPE	CIVIL CONST.	ELECT. INST.	FREQ.	DELIV. DATE	FY	REG	REMARKS
77. Phoenix, AZ 26R	4CEC	RCS		R			111.9	8/83	80	WE	
78. Lebanon, NH 18	2PRC	RCVR	C	R				8/83	79A	NE	
79. Depot Mobile System	-	RCVR		R				9/83	80R	AC	
80. Depot Mobile System	-	RCVR		R				9/83	80R	AC	
81. Depot Mobile System	-	RCVR		R				10/83	80R	AC	
82a.Fargo, ND 35	PFFC	RCS/I		R				10/83	80R	RM	(LOC)
82b.Norfolk, VA 05	PDRC	RCVR		R			331.4	10/83	80R	EA	(GS)
83a.Salem, OR 31	PFBC	RCS		R			110.3	11/83	80R	NW	(LOC)
83b.Los Angeles, CA 25R	PEAC	RCS/I	C	R			333.8	11/83	80R	WE	(GS)
84a.Pocatello, ID 21	PFAC	RCS		R			110.3	11/83	80R	NW	(LOC)
84b.Lynchburg, VA 03	PJGC	RCS	C	R			334.4	11/83	80R	EA	(GS)
85a.Pendleton, OR 25R	PEZC	RCS		R			110.3	12/83	80R	NW	(LOC)
85b.Terre Haute, IN 05	PJSC	RCVR		R			333.2	12/83	80R	GL	(GS)
86. Martha's Vineyard, MA 06	4BVC	RCS/I		T	4/83	10/83	108.7	12/83	80	NE	
87. Bradford, PA 14	UPUC	RCS/I		T	4/83	10/83		12/83	80	EA	
88. Bismarck, ND 13	4BWC	RCS/I		T	4/83	10/83		12/83	80	RM	
89. Blythe, CA 26	4CDC	RCVR		T	4/83	10/83		12/83	80	WE	
90. Amarillo, TX 22	4BYC	RCS/I		T	4/83	10/83	110.3	12/83	80	SW	
91a.Allentown, PA 06	PFMC	RCS		R			110.7	12/83	80R	EA	(LOC)

Full Systems

LOCATION	PCN	REMOTE MONITOR	CONV. KITS	INST. TYPE	CIVIL CONST.	ELECT. INST.	FREQ.	DELIV. DATE	FY	REG	REMARKS
91b.Duluth, MN 09	PJPC	RCS	C	R			335.0	12/83	80R	GL	(GS)
92a.Elmira, NY 24	PFNC	RCS/I		R			109.1	1/84	80R	EA	(LOC)
92b.Keene, NH 02	PJTC	RCVR	C	R			329.3	1/84	80R	NE	(GS)
93. Wheeling, WV 03	PFTC	RCS	S	R			109.7	1/84	80R	EA	
94. Wilkes Barre, PA 04	PFUC	RCS/I	S	R			109.9	2/84	80R	EA	
95a.Yakima, WA 27	PFCC	RCS		R			110.1	2/84	80R	NW	(LOC)
95b.Cincinnati, OH 20L	PJMC	RCS		R			330.8	2/84	80R	GL	(GS)
96a.Huron, SD 12	PDWC	RCS		R			110.3	3/84	80R	RM	(LOC)
96b.Chicago (M), IL 31L	PJQC	RCS		R				3/84	80R	GL	(GS)
97. Depot		RCVR		R				3/84	80R		
98. West Memphis, AR 17	4CCC	RCVR		R			110.7	4/84	80	SW	
99. Depot		RCVR					110.7	4/84	80		

Partial LOC/OM

	LOCATION	PCN	REMOTE MONITOR	CONV. KITS	INST. TYPE	CIVIL CONST.	ELECT. INST.	FREQ.	DELIV. DATE	FY	REG	REMARKS
1.	Oneonta, NY 06	TQRC	RCVR		R				7/81	78	EA	
2.	Huntington, WV 12	PEGC	RCS/I		R			109.9	7/81	77	EA	
3.	Toms River, NJ 06	2TMC	RCVR		T	12/80	6/81		7/81	79A	EA	
4.	Newport, RI 04	TRBC	RCVR		T	12/80	6/81	110.9	7/81	78	NE	DME
5.	Bedford, MA 29	TRCC	RCS/I		R			109.5	8/81	77	NE	
6.	LaGuardia, NY 13	PEHC	RCS/I		R			108.5	8/81	77	EA	
7.	Aurora, IL 09	2TNC	RCVR		R				9/81	79A	GL	NDB
8.	Newark, NJ 4L	PEJC	RCS/I		R			108.7	9/81	77	EA	
9.	Meadville, PA 07	7QQC	RCVR		R				10/81	78	EA	
10.	Niagara, NY 28R	PEKC	RCS		R			110.0	10/81	77	EA	
11.	Westerly, RI 07	2TSC	RCVR		T	3/81	9/81		10/81	79A	NE	
12.	Wellsville, NY 28	TQTC	RCVR		T	3/81	9/81		10/81	78	EA	
13.	Ironwood, MI 27	TQWC	RCVR		T	3/81	9/81		10/81	78	GL	
14.	St. Marys, PA 28	TQSC	RCVR		T	3/81	9/81		10/81	78	EA	
15.	Brainard, MN 04	TQVC	RCVR		T	3/81	9/81		10/81	78	GL	NDB
16.	Ardmore, OK 30	TREC	RCVR		R				11/81	78	SW	
17.	Rochester, NY 28	PEMC	RCS/I		R			109.5	11/81	77	EA	
18.	Beverly, MA 16	TRAC	RCVR		R			108.7	12/81	78	NE	DME
19.	Norman, OK 03	TRFC	RCVR		R				12/81	78	SW	

Partial LOC/OM

	LOCATION	PCN	REMOTE MONITOR	CONV. KITS	INST. TYPE	CIVIL CONST.	ELECT. INST.	FREQ.	DELIV. DATE	FY	REG	REMARKS
20.	Staunton, VA 04	PENC	RCS		R			109.5	1/82	77	EA	
21.	Richmond, VA 06	PELC	RCS/I		R			110.3	1/82	77	EA	
22.	Olean, NY 22	2TLC	RCVR		T	6/81	12/81		1/82	79A	EA	
23.	Clinton, IA 03	TQKC	RCVR		T	6/81	12/81		1/82	78	CE	
24.	Hays, KS 34	TQLC	RCVR		T	6/81	12/81		1/82	78	CE	
25.	Liberal, KS 35	TQNC	RCVR		T	6/81	12/81		1/82	78	CE	
26.	Menominee, MI 14	2TQC	RCVR		T	6/81	12/81		1/82	79A	GL	
27.	Ft. Collins, CO 33	UGWC	RCVR		R				2/82	78	RM	
28.	York, PA 16	FRGC	RCVR		R				2/82	78	EA	
29.	Utica, NY 33	PEPC	RCS/I		R			109.3	3/82	77	EA	
30.	Batavia, NY 28	2TKC	RCVR		R				3/82	79A	EA	
31.	Portland, OR 20		RCVR		R			108.9	4/82	79A	NW	NDB
32.	Hastings, NE 32	2TJC	RCVR		R				4/82	79A	CE	NDB
33.	Eldorado, AR 04	2TYC	RCVR		T	9/81	3/82		4/82	79A	WE	
34.	Auburn, AL 28	2TVC	RCVR		T	9/81	3/82		4/82	79A	SO	
35.	Elko, NW 23	2TGC	RCVR		T	9/81	3/82	108.9	4/82	78	WE	
36.	Alice, TX 31	2TWC	RCVR		T	9/81	3/82		4/82	79A	SW	
37.	Arlington, WA 33	2TTC	RCVR		T	9/81	3/82	111.5	4/82	79A	NW	NDB
38.	Depot		RCVR		R				5/82	78		

Partial LOC/OM

	LOCATION	PCN	REMOTE MONITOR	CONV. KITS	INST. TYPE	CIVIL CONST.	ELECT. INST.	FREQ.	DELIV. DATE	FY	REG	REMARKS
39.	Dayton (G), OH 2	TQYC	RCS		R			109.5	5/82	78	GL	
40.	Depot		RCVR		R				6/82	78		
41.	Depot		RCVR		R				6/82	80		
42.	Monterey, CA 28	2TZC	RCS/I		T	12/81	6/82		7/82	79A	WE	DME
43.	Red Bluff, CA 33	3AVC	RCVR		T	12/81	6/82		7/82	79A	WE	
44.	Milwaukee (T) WI, 15L	4CVC	RCVR		T	12/81	6/82	108.5	7/82	80	GL	
45.	Flying Cloud, MN 9L	2TPC	RCVR		T	12/81	6/82	109.7	7/82	79A	GL	
46.	New Bedford, MA 23	2TRC	RCS/I		T	12/81	6/82	109.7	7/82	79A	NE	DME
47.	Iowa City, IA 35	4CPC	RCVR		R				7/82	80	CE	
48.	Milwaukee, WI 25L	TQZC	RCS/I		R			111.5	7/82	78	GL	
49.	Marianna, FL 36L	4DDC	RCVR		R				8/82	80	SO	
50.	Spokane (FF), WA 21	4DAC	RCVR		R				8/82	80	NW	
51.	LaGrange, GA 31	4DCC	RCVR		R				9/82	80	SO	
52.	Topeka (FF), KS 13	4CRC	RCS/I		R				9/82	80	CE	
53.	Topeka (PB), KS 31	4CSC	RCS/I		R				10/82	80	CE	
54.	Selma, AL 33	4DEC	RCVR		T	3/82	9/82		10/82	80	SO	Craig Field
55.	McCook, NB 30	4CQC	RCVR		T	3/82	9/82		10/82	80	CE	
56.	Corvalis, OR 17	4CYC	RCVR		T	3/82	9/82		10/82	80	NW	NDB
57.	Worchester, MA 29	4CWC	RCS/I		T	3/82	9/82		10/82	80	NE	DME

Partial LOC/OM

	LOCATION	PCN	REMOTE MONITOR	CONV. KITS	INST. TYPE	CIVIL CONST.	ELECT. INST.	FREQ.	DELIV. DATE	FY	REG	REMARKS
58.	Eaglecreek, IN 21	4CUC	RCVR		T	3/82	9/82		10/82	80	GL	
59.	Wichita, KS 19L	4CTC	RCS		R				10/82	80	CE	
60.	Crestview, FL 17	4DBC	RCVR		T				1/83	80	SO	
61.	Chadron, NB 20	4CNC	RCVR		T				1/83	80	CE	
62.	Waycross, GA 18	4DFC	RCVR		T				1/83	80	SO	

Notes: Richmond, VA 06 and York, PA 06 deleted 4th qtr FSR.

Partial Glide Slope/Middle Marker

	LOCATION	PCN	REMOTE MONITOR	CONV. KITS	INST. TYPE	CIVIL CONST.	ELECT. INST.	FREQ.	DELIV. DATE	FY	REG	REMARKS
1.	Spokane, WA 03	TRZC	RCVR		R			333.8	7/81	78	NW	OM required
2.	Bedford, MA 29	TRCC	RCS/I		R			332.6	8/81	78	NE	
3.	Schenectady, NY 22	TRWC	RCVR	S	R				9/81	78	EA	
4.	Rockland, ME 03	TRYC	RCVR	C	R			330.2	10/81	78	NE	
5.	Evansville, IN 22	TSCC	RCS		R			333.8	11/81	78	GL	
6.	Southbend, IN 27	TSDC	RCS		R			332.0	12/81	78	GL	
7.	Fayetteville, NC 03	ITHC	RCS	C	R				1/82	79S	SO	
8.	Lincoln, NE 35L	TSBC	RCS/I	C	R				1/82	78	CE	
9.	Lake Charles, LA 15	TSFC	RCS		R			109.1	2/82	78	SW	
10.	Longview, TX 13	TSGC	RCS	C	R			109.5	2/82	78	SW	
11.	Midland, TX 10	TSHC	RCS		R			110.3	3/82	78	SW	
12.	Portland, ME 11	TSEC	RCS/I		R			333.8	3/82	78	NE	
13.	Greer, SC 21	2SAC	RCVR		T	8/81	2/82		3/82	78	SO	
14.	Jackson, MS 16	TPHC	RCVR		T	8/81	2/82		3/82	78	SO	
15.	Sioux City, IA 13	2TBC	RCS/I		T	8/81	2/82		3/82	79A	CE	
16.	Bar Harbor, ME 22	2TEC	RCVR	C	T	8/81	2/82	334.1	3/82	79A	NE	
17.	Elko, NV 23	2TGC	RCVR	C	T	8/81	2/82		3/82	79A	WE	
18.	Moline, IL 27	PBWC	RCVR		T	8/81	2/82	329.6	3/82	77	GL	
19.	Springfield, MO 01	ISKC	RCS/I		R				4/82	79S	CE	

Partial Glide Slope/Middle Marker

	LOCATION	PCN	REMOTE MONITOR	CONV. KITS	INST. TYPE	CIVIL CONST.	ELECT. INST.	FREQ.	DELIV. DATE	FY	REG	REMARKS
20.	Charleston, WV 23	ISMC	RCS	C	R			335.0	4/82	79S	EA	
21.	Philadelphia, PA 17	ISNC	RCS	S	R			332.0	5/82		EA	
22.	Erie, PA 06	ISPC	RCS/I	C	R			335.0	5/82	79S	EA	
23.	Newark, NY 22L	ISRC	RCS	S	R			330.5	6/82	79S	EA	
24.	Niagara Falls, NY 28R	ISTC	RCS	C	R			334.4	6/82	79S	EA	
25.	Jacksonville, FL 25	4CMC	RCVR		T				6/82	80	SO	
26.	Muskegon, MI 23	4CGC	RCS		T			332.6	6/82	80	GL	
27.	Depot				R				7/82			
28.	Roanoke, VI 33	ISVC	RCS	C	R			333.2	7/82	79S	EA	
29.	Utica, NY 33	ISWC	RCS/I		R			332.0	8/82	79S	EA	
30.	Hyannis, MA 24	ITAC	RCS		R			329.6	8/82	79S	NE	
31.	Nantucket, MA 24	ITBC	RCS/I		R			331.4	9/82	79S	NE	
32.	New Bedford, MA 05	ITCC	RCS/I		R			333.2	9/82	79S	NE	
33.	Charlotte, NC 03	ITEC	RCS	C	R				10/82	79S	SO	
34.	Knoxville, TN 04L	ITKC	RCS	C	R				10/82	79S	SO	
35.	Depot		RCS		R				11/82			
36.	Ocala, FL	2TFC	RCVR		R				11/82	79A	SO	
37.	Burlington, VT 15L	2SRC	RCS		R			335.0	12/82	79A	NE	
38.	Burbank, CA	PDZC	RCS		R			332.6	12/82	80R	WE	

Partial Glide Slope/Middle Marker

	LOCATION	PCN	REMOTE MONITOR	CONV. KITS	INST. TYPE	CIVIL CONST.	ELECT. INST.	FREQ.	DELIV. DATE	FY	REG	REMARKS
39.	Albany, NY 19	2SQC	RCS/I		R				1/83	79A	EA	
40.	San Francisco, CA 19L	2SVC	RCS/I		R				1/83	79A	WE	
41.	Ontario, CA 25	2SUC	RCS		R				2/83	79A	WE	
42.	Kansas City, MO 18	PDMC	RCS		R			333.8	2/83	80R	CE	
43.	Depot	-	RCVR						3/83			
44.	Depot	-	RCVR						3/83			

Note: Memphis, TN 09 and Richmond, VA -6 deleted 4th qtr FSR.

ATTACHMENT 2. REPLACE OBSOLETE TUBE-TYPE ILS EQUIPMENT

1. PROGRAM SUMMARY.

a. The program to replace obsolete tube-type instrument landing system (ILS) equipment will be a limited program designed to ensure continued ILS service at all airports presently served by ILS until the transition to the microwave landing system (MLS) permits decommissioning.

b. The program will not attempt to replace all tube-type ILS equipment but will try to ensure that all airports presently equipped with ILS have at least one solid-state ILS, and that the solid-state ILS serves the prime instrument runway. The program will also attempt to alleviate the future reliability and supply problems of the remaining tube-type ILS equipment and of solid-state ILS equipment employing mechanical modulators. This will be possible by making available equipment made excess through this and other obsolete equipment replacement programs. The equipment to be made available will include solid-state modulators made excess through this program, vhf solid-state transmitters made excess through the second-generation VORTAC program, and use of other equipment as appropriate. The tube-type ILS equipment made excess through this program will also be reviewed by the FAA Depot prior to final disposition as a source of parts to maintain supply support for the remaining tube-type equipment.

2. CRITERIA FOR REPLACEMENT WITH ALL SOLID-STATE EQUIPMENT. Replacement of tube-type ILS equipment will be limited to sites where it is the only ILS serving the airport, or it is serving the prime instrument runway. Additionally, the majority of the tube-type ILS equipment in the state of Alaska will not be replaced because of the expedient manner in which the transition to MLS can and will be accomplished there. Individual components of the system to be replaced shall be treated in the following manner:

a. Alford eight-loop antenna systems will be replaced. Where an existing backcourse must be maintained, the replacement antenna system shall be provided in accordance with paragraph 6 of this attachment.

b. Shelter replacement shall be limited to those instances in which the alternative of refurbishing the existing shelter is not cost beneficial. For the purpose of cost comparison, a material cost of $15,000 shall be used for the localizer/glide slope shelters and $10,000 for the marker beacon shelters.

c. V-ring antenna systems shall not be replaced, unless reallocation to other sites is required (in accordance with paragraph 6 of this attachment) to preserve existing backcourse requirements.

d. Traveling wave antenna systems shall not be replaced.

e. Glide slope antenna masts shall be replaced only where they are not of the latest design.

f. Glide slope bent-dipole antennas shall be replaced.

g. Test equipment provided for each localizer and/or glide slope shall be limited to wattmeter detector elements of appropriate size, four 5-watt dummy loads, and a digital voltmeter. Any additional test equipment beyond this shall be provided only as required and only if requested by a project change document (PCD). Each PCD requesting additional test equipment shall be accompanied by a full and complete justification.

3. SOURCE OF EQUIPMENT AND FUNDS. The program will be supported in two phases. The first phase will utilize Mark IF equipment and funding made available through reprogramming action. The second phase will be a new procurement under the FY 1983 replace obsolete tube-type ILS program. The first phase, utilizing Mark IF equipment presently under contract, will emphasize replacement of eight-loop antenna systems which do not have a backcourse requirement. This will make maximum use of the equipment supplied.

4. DISPOSITION OF SURPLUS MATERIAL. Excess material will be disposed of as indicated below:

a. Portable ILS receivers, type number FA-9945, received as part of the first phase of the replace obsolete tube-type ILS program, shall be shipped to the FAA Depot, marked for F&E stock.

b. Regions shall advise APM-400 of solid-state modulators made available through the replacement program. APM-400 will either approve of their local use within the region to replace mechanical modulators or will provide shipping instructions.

c. As the second generation VORTAC progresses, regions shall advise APM-400 of the availability of vhf navaid transmitters, type number FA-9467, made surplus through this program. APM-400 will either approve of their local regional use to replace tube-type transmitters at tube-type localizer systems not scheduled for complete replacement or will provide shipping instructions.

d. Use of tube-type ILS equipment, made excess through this program, to establish new facilities is strictly prohibited.

5. INTERFACE OF MARK 1F PARTIAL INSTRUMENT LANDING SYSTEMS TO PARTIAL INSTRUMENT LANDING SYSTEMS OF DIFFERENT DESIGN.

a. Use of Mark IF equipment in the replace obsolete program may, in some cases, result in operating a Mark IF partial ILS system (loc/om or gs/mm) in conjunction with solid-state Mark IA B, C, D, or E equipment. In these cases, problems will be encountered in interfacing the two systems to a common remote status and control unit. In order to resolve this problem, and enable use of a single Mark IF (type number FA-9938) remote status and control unit to remotely monitor the status of all components of the ILS, regions shall take action to recover the FA-9934 marker beacon and control units and demarcation boxes (7A2) from Mark IF marker beacon stations which are not required to be remotely monitored. Monitoring and automatic shutdown shall be restored at these sites by:

(1) Removing the red/blue wire from W3P1, connected to the transmitter, and taping it back.

(2) Removing the transfer switch, 9S2, from the removed FA-9934 marker beacon control unit, and taping back the wires connected to it.

(3) Installing the removed transfer switch on the front panel of the marker beacon transmitter unit, below the existing 2W3J1 and in line with the existing switch 2S1.

(4) Wiring the transfer switch 2S1-1 to 2E23 (ground) and 2S1-2 to 2J1-B.

(5) Installing a jumper between 2J1-B and 2J1-C.

b. The recovered marker beacon control units shall be used to interface partial ILS systems other than Mark 1F to the type FA-9938 remote status and control unit. To accomplish this, they must be modified in the following manner:

(1) On the component side of the marker beacon control circuit board 9A1, cut through the foil connecting U11-6 to U8-1 and U8-2.

(2) On the foil side of the board, solder a wire jumper from U11-6 to P1-5.

(3) On the foil side of the circuit board, solder a wire jumper to short out R50 and R51.

(4) On the chassis of the marker beacon control unit, solder a 1.5 k-ohm, 0.25-watt carbon resistor between pin 1 and pin 5 of 9XA1, and a 100 k-ohm, 0.25-watt carbon resistor between pin 5 and pin 11 of 9XA1.

(5) On the chassis, wire 9XA1, pin 11 to 9TB1-10.

c. Once modified, the type FA-9934 marker beacon control unit may be used to interface ILS equipment other than Mark IF ILS equipment to the type FA-9938 Mark IF remote status and control unit in the following manner.

DC voltage presently fed to J1 pin T of the type FA-9427/2 interlock unit is rerouted to 9TB1-2 and 9TB1-7 of the FA-9934 unit. Status presently available at the J1 pin P of the FA-9427/2 unit (combined with the signal available at J1 pin R for dual equipment using a diode logic OR gate) is fed to 9TB1-10 of the FA-9934 unit. Terminals 9TB1-8 and 9TB1-9 are connected through the demarcation box to the phone line for lightning protection. Terminals 9TB1-6 and 9TB1-2 may then be used to provide controlling voltage to an interlock relay, such as the GTE Automatic Electric part number PP-2643-742 or equal (Note: relay must not be of the time delay type). One of the form C contacts of the interlock relay may then be fed signals presently available at J1 pins B and C of the FA-9427/2 unit.

6. BACKCOURSE REQUIREMENTS. One of the problems which will be encountered in implementing the replace obsolete tube-type ILS program will be the loss of existing backcourses where Alford eight-loop antenna systems are to be replaced. Restrictions on the procurement of ILS equipment and the establishment of new systems will not permit satisfying backcourse approach requirements through establishing a facing localizer/outer marker system. Accordingly, valid backcourse requirements will have to be met through the use of existing antenna systems. At present, the only acceptable antenna capable of providing a backcourse other than the Alford eight-loop is the V-ring antenna. In order to minimize costs, regions shall validate affected systems in regard to the necessity of retaining the existing backcourse. Valid requirements shall be met by identifying existing tube-type instrument landing systems scheduled for replacement, which have V-rings and do not have or do not require a backcourse. Replacements for some of these systems will be provided complete with new antenna systems. If required, additional V-ring antennas will be made available by replacing existing V-ring antenna systems with a reduced aperature system. The recovered V-ring antennas will be used to provide a sufficient number of eight element V-ring antenna systems to satisfy valid backcourse requirements at replacement projects. The reconfigured eight element systems will utilize new distribution and monitor networks similar to those provided with the Mark IE and Mark IF systems. Use standard
* drawings D 6227-1 through 5 for accomplishing the conversion to an eight element array, *
and for its installation.

7. USE OF TYPE FA-9467 VHF NAVAID TRANSMITTERS. Solid-state VHF navaid transmitters type FA-9467 will become excess as a result of the second generation VORTAC replacement program. As this program proceeds, the navaid transmitters made available will be used to replace tube-type localizer transmitters at sites not scheduled for replacement. Installation drawings are provided in drawings D-6224-1 through D-6224-11. Installation of solid-state type FA-9467 transmitters at sites installed in accordance with drawing numbert D-50992-1 will require the installation of an additional equipment rack.
* The transmitter power output shall be set to meet the coverage requirements for the facility. The initial and operating tolerances for the facility shall be those listed under tube-type equipment in Order 6750.15A, Maintenance of ILS Localizer Equipment. *

8. USE OF TYPE FA-9670 and TYPE FA-8993 SOLID-STATE MODULATORS.
* Solid-state modulators, types FA-9670 (preferred for the Mark 1a) and FA-8993, will *
become available from tube-type localizers scheduled for replacement. As the replacement program proceeds, these modulators will be made available to replace mechanical modulators at the tube-type localizers not scheduled for replacement, at solid-state Mark
* 1A localizers, and at solid-state Mark 1C localizers. At dual system sites one modulator is
to replace the two existing modulators. In order to be used with Mark 1A and Mark 1C *
localizers, the solid-state modulators must first be rewired for 120-volt operation. For type FA-9670 solid-state modulators, this requires (1) removing the jumper between the unit 2 power supply transformer, T1 terminals 3 and 5, and (2) adding a jumper between terminals 1 and 5, and a jumper between terminals 3 and 7. For type FA-8993 solid-state modulators, this requires (1) removing the jumper between the unit 1 modulator transformer T1, terminals 2 and 3, and (2) adding a jumper between terminals 1 and 2, and a jumper between terminals 3 and 4. Modulators rewired for this purpose shall be prominently marked to indicate that they are wired for 120-volt operation. Installation, except for physical size, is identical to the existing Mark 1A and Mark 1C mechanical modulator.

9. USE OF TYPE FA-9670 AND TYPE FA-8993 SOLID-STATE MODULATORS AT DUAL TUBE-TYPE LOCALIZERS. At dual equipment tube-type localizers where both transmitters are to be replaced with solid-state FA-9467 VHF transmitters, control of the changeover relays in the amplitude and phase control unit will require an appropriately controlled extra set of relay contacts. To obtain these, the automatic transfer unit must be modified as follows:

a. Remove all wires from K6 (monitor power transfer relay) and tape back individually.

b. Remove wires from TB1 and terminals 12 and 13 and tape back.

c. Remove white wire from XF5 and tape back.

d. Remove white/green wire from XF7 and tape back.

e. Add wire from TB1 terminal 12 to K6-L-NO.

f. Add wire from TB1 terminal 13 to K6-L-C.

g. Add wire from XF5 to TB1 terminal 9.

h. Add wire from XF7 to TB1 terminal 8.

i. The system wired as shown in drawings D-6224-7 through D-6224-11 will now utilize the K6 relay to operate the APCU transfer relay, while primary power for the monitors will no longer be switched from number 1 regulator to number 2 regulator during a transfer.

10. USE OF FA-8712 UHF TRANSMITTERS. As the replacement of UHF communication transmitters with solid-state equipment proceeds, hybrid UHF transmitters, which are solid-state except for the final stage, will become available. These transmitters will be made available to replace transmitters at tube-type glide slope stations not scheduled for replacement. To accomplish this, an adaptor panel must be fabricated. Dimensions of the panel are as shown in drawing D-6223-2. Control of the transmitter is accomplished using
* the circuitry of drawing D-6223-1. The transmitter power output shall be set to meet the coverage requirements for the facility. The initial and operating tolerances for the facility shall be those listed under tube-type equipment in the order for that particular configuration of glide slope equipment. *

11. TRAVELING WAVE ANTENNA TO MARK 1F EQUIPMENT INTERFACE. The Mark 1F ILS equipment interfaces readily with the FA-9320 traveling wave antenna system, with the single exception of antenna misalignment monitoring and cable fault monitoring. In the traveling wave antenna system, both of these are monitored through the course and width channels rather than independently as in the Mark 1F system. It is, therefore, required to bypass executive control of the Mark 1F monitor's independent misalignment/cable fault alarm. This is accomplished by placing a jumper between 3TB1-4 and 3TB1-5 at the back of
* the monitor. The dc for the detectors should be routed first through the misalignment detector (MAD) switches and then to the detectors. *

* 12. MARK 1F EQUIPMENT WITH V-RING ANTENNA.

a. To interface a V-ring antenna to the Mark 1F equipment requires:

(1) Changing input power requirements of the V-ring cable fault switching unit from ac to dc so as not to negate the standby power capability of the Mark 1F equipment.

(2) Bypassing the separate cable fault and antenna misalignment capability of the Mark 1F monitor, and using the INTERRUPTED WIDTH SIGNAL method used in the V-ring antenna system.

(3) Providing transient protection at both the shelter and at the antenna array.

(4) Providing an rf amplifier for width and course monitor signals, if required.

(5) The following lines between the shelter and antenna array for monitoring are required:

(a) +15Vdc and return.

(b) Course detector output.

(c) Width detector output.

(d) +27Vdc and return.

b. To change input power to dc on the V-ring antenna cable fault switching unit:

(1) Disconnect transformer 5A2T1 from 5A2A1 (E1 and E2).

(2) On printed circuit board 5A2A1 change R2 from 8.2K to 10K (fixed film resistor RLR07C1002GR). This should change the regulated output voltage at TP2 to approximately 23.4Vdc.

(3) Remove diodes CR2 through CR5 on 5A2A1.

(4) Replace CR3 and CR4 with wire jumpers.

(5) Wire 5A2A1E1 to 5A2TB1-11, and 5A2A1E2 to 5A2TB1-12. TBI-12 is on the ground return for dc. TBI-11 will be routed through transient (see paragraph 12d below) suppressor to +27Vdc from shelter.

c. To bypass separate cable fault/antenna misalignment on Mark 1F monitor.

(1) On the back of the Mark 1F monitor (FA-9907) jumper 3TB1-4 and 3TB1-5. This essentially parallels the normal monitor ground to the fault/misalignment input to the control unit. It is the same method used in the glide slope monitor to bypass the previously used glide slope tower tilt detector.

(2) The bulbs for the cable fault and misalignment indicators should be removed. *

* d. To provide transient protection:

(1) Circuit board LOC 11A2 and 6A5 will have to be modified to use one of the unused transient suppressors for the +27Vdc to the antenna array. Replace 6A5VR9 with a 31V, 1W zener diode, and replace 11A2VR6 (13V, 1W zener diode) with a 31V, 1W zener diode.

(2) Connect +27Vdc from FA-9911, power supply 7TB1-18 to wiring panel 1A1TB1-15. Route +27V from 1A1TB1-15 to 11A2TB2-6; 11A2TB1-6 to antenna array 6A5TB1-12; and 6A5TB1-12 to V-ring cable fault switching unit 5A2TB1-11.

(3) Connections for course position and course width detectors and +15Vdc are the same as shown in the Mark 1F instruction book. *